Climate Change Adaptation Advisory Committee

Overview for the Massachusetts Legislature on Climate Change Adaptation

Presentation Title: Presentation by the members of the Climate Change Adaptation Advisory Group

- Overview of the Advisory Group
- Introduction to Climate Change Science and Data

Date of Presentation: 28 October 2009

The following presentation is offered for discussion purposes only and does not necessarily represent current statute, regulation, or policy positions of the Commonwealth of Massachusetts unless specifically acknowledged.

This presentation is not to be cited as a reference. Its purpose is to foster open and broad discussion of the issues as well as help assure public awareness of the discussions as of the date of the presentation.

CLIMATE CHANGE ADAPTATION ADVISORY COMMITTEE

An update to the MA Legislature

October 28, 2009

CHARGE TO ADVISORY COMMITTEE

Section 9 of GWSA

- Define predicted climate change
- Identify potential vulnerabilities due to climate change
- Evaluate strategies for adapting to the predicted effects of climate change
- Prepare report to Legislature

COMPOSITION OF ADVISORY COMMITTEE

35 members

Act required expertise in:

- transportation and built infrastructure
- commercial, industrial and manufacturing activities;
- low income consumers
- energy generation and distribution
- land conservation
- water supply and quality
- recreation
- ecosystems dynamics
- coastal zone and oceans
- rivers and wetlands
- local government

Committee also included: public health, insurance, forestry, agriculture, public safety

ADAPTATION SUBCOMMITTEES

150+ members

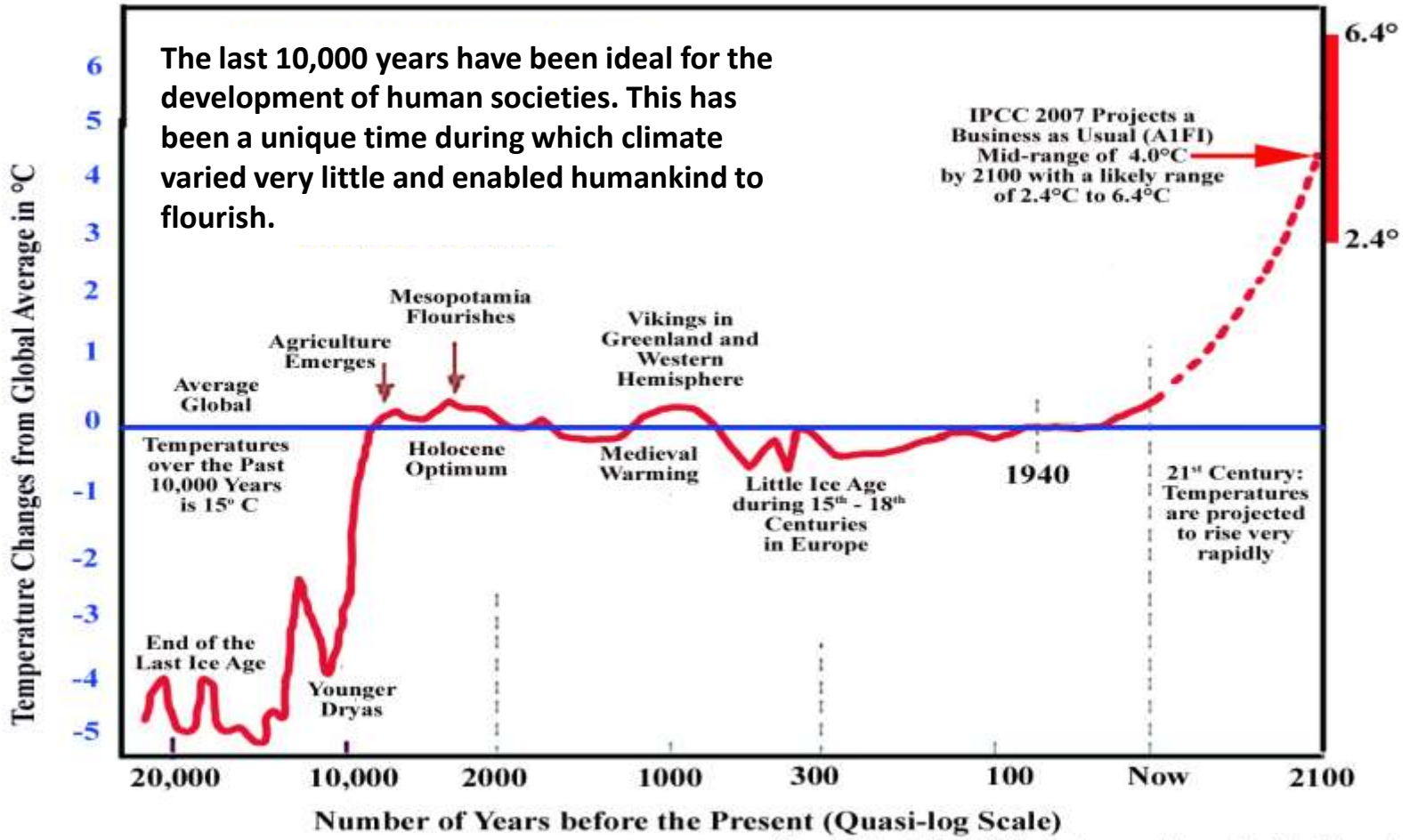
- Local Economy
- Natural Resources and Habitat
- Human Health and Welfare
- Key Infrastructure
- Coastal Zone and Oceans

CLIMATE CHANGE ADAPTATION

SCIENCE and DATA

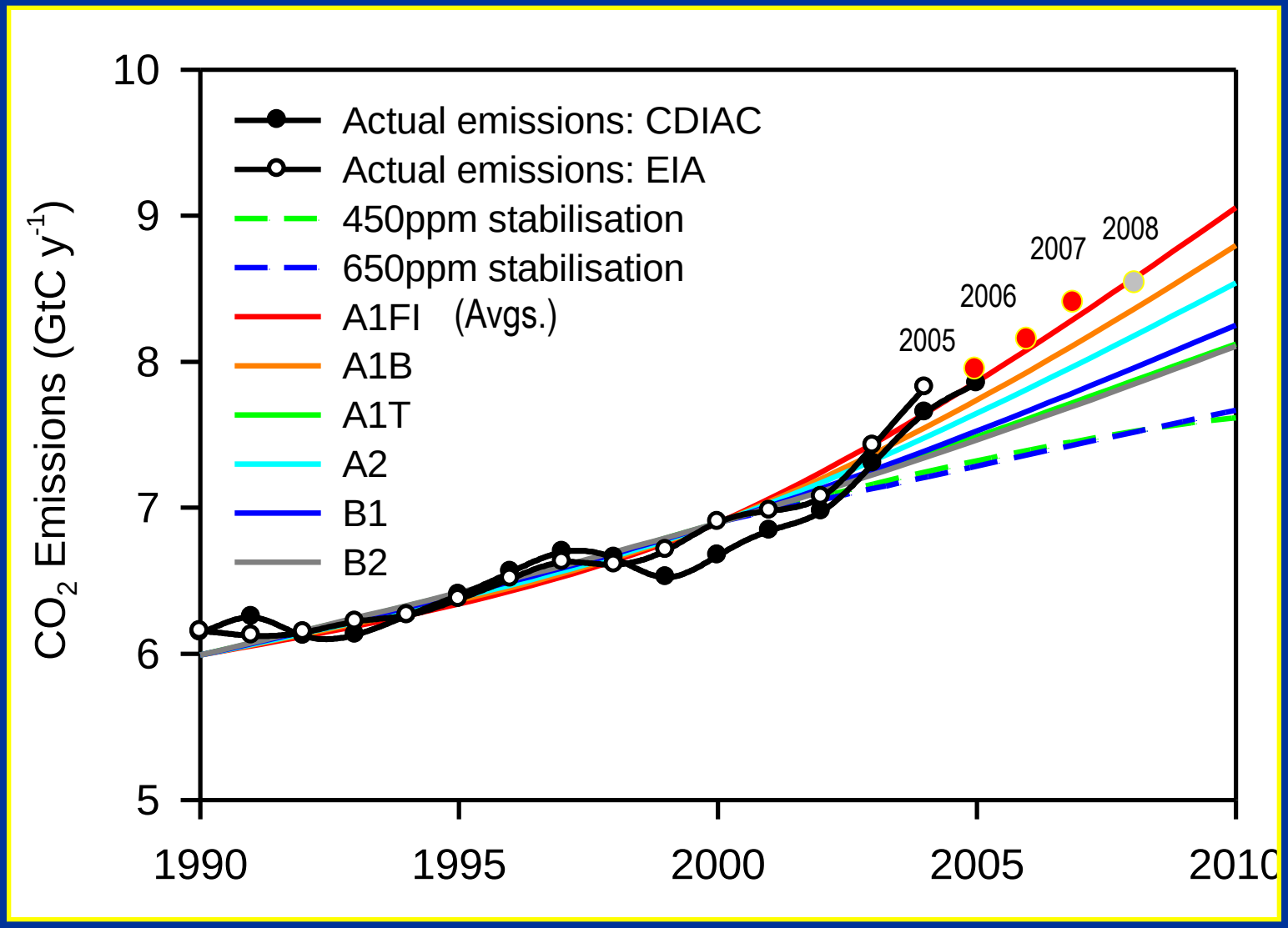
Rob Thieler
U.S. Geological Survey
Coastal and Marine Geology Program
Woods Hole, MA

Past, Current, and Projected Global Temperature



Source: Adapted from "Climate change and human health - risks and responses" published by WHO in collaboration with UNEP and WMO 2003 and more recent data from IPCC 2007.

Fossil Fuel Emissions: Actual vs. IPCC Scenarios



(Raupach et al., 2007; Global Carbon Project, 2009, update)

Predicted Northeast Climate Change Impacts

Parameter	Current (1961-1990)	Predicted Range by 2100
Temperature (° C)	7.8	10 to 13
Precipitation (inches)	40.5	43 to 46
Sea level rise (inches)	3.1	10 to 35
Streamflow-spring peak flow (days)	84.5	80 to 72
Short Droughts (#/30 yr)	12.61	16 to 23
Snow Days/Month (days)	5.2	4 to 1
Length of growing season (days)	184	196 to 227

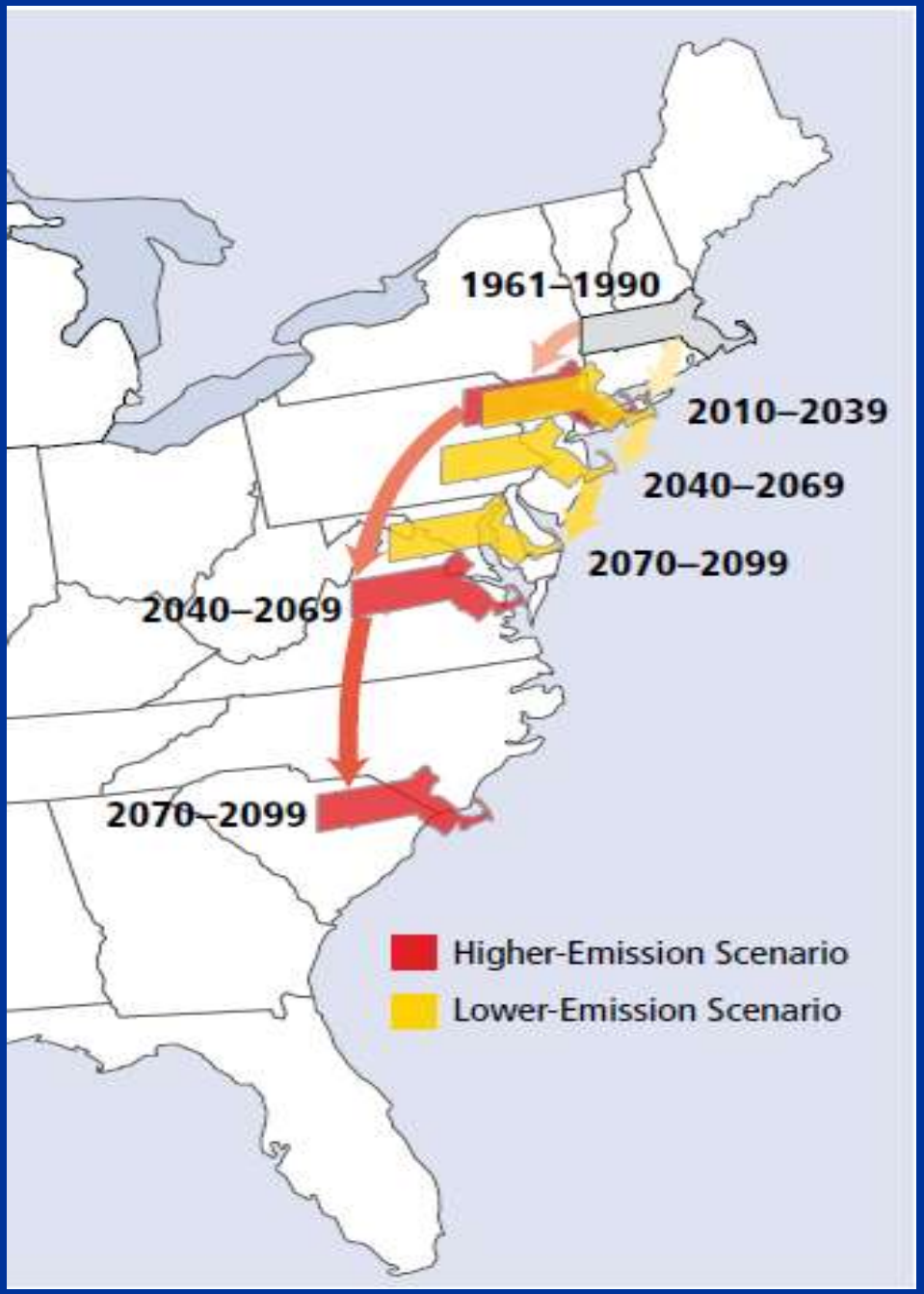
(Hayhoe et al., 2006)

Climate Change in the Northeast is already happening

- Annual temperatures across the Northeast have warmed almost 2°F since 1970
- Winters have been warming fastest, at 1.3°F per decade since 1970
- Winter snowpack is decreasing
- Plants are flowering earlier in the spring
- Extreme heat in summer is becoming more frequent

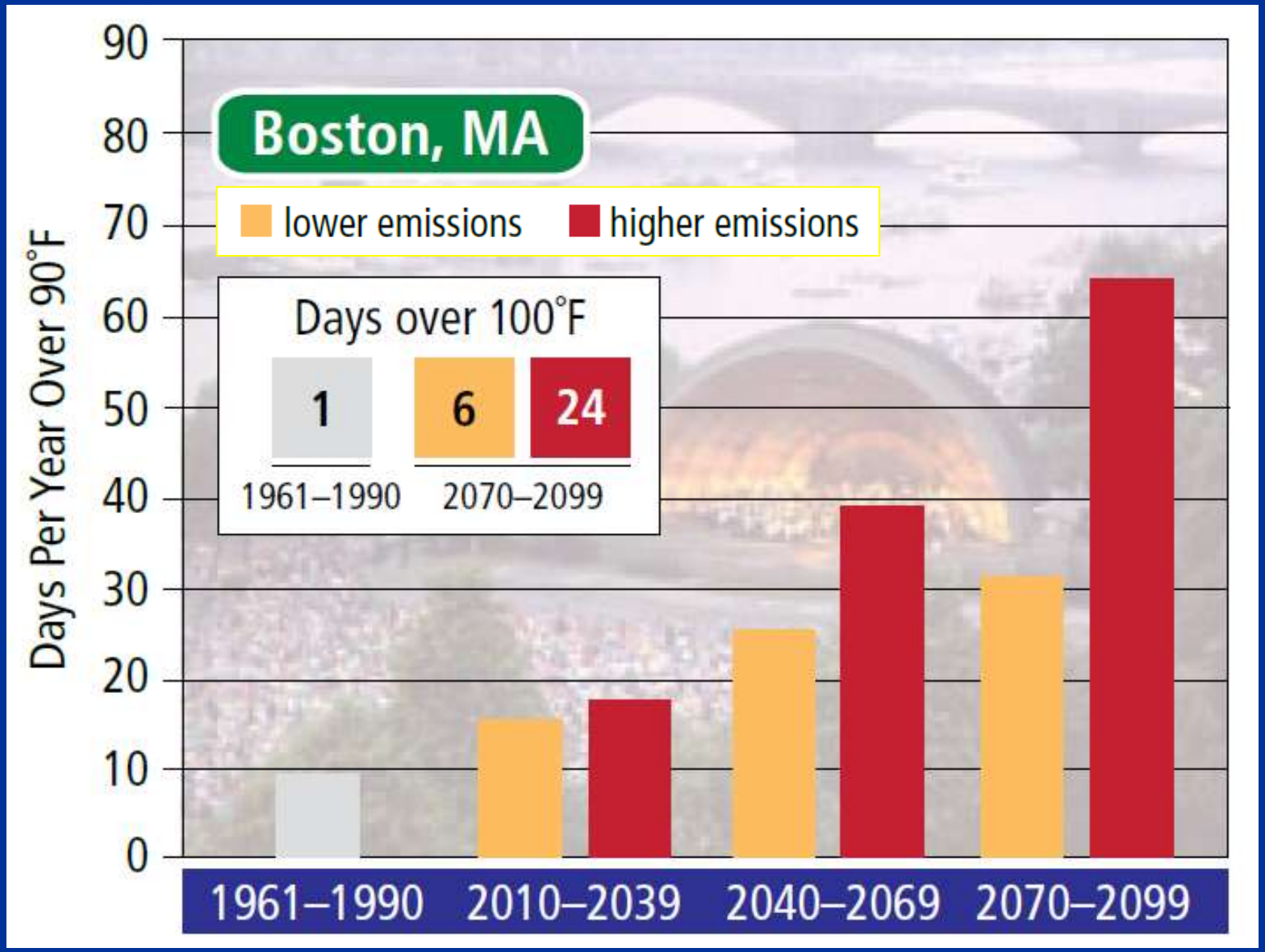
Changes in average summer heat index

How hot will it feel?



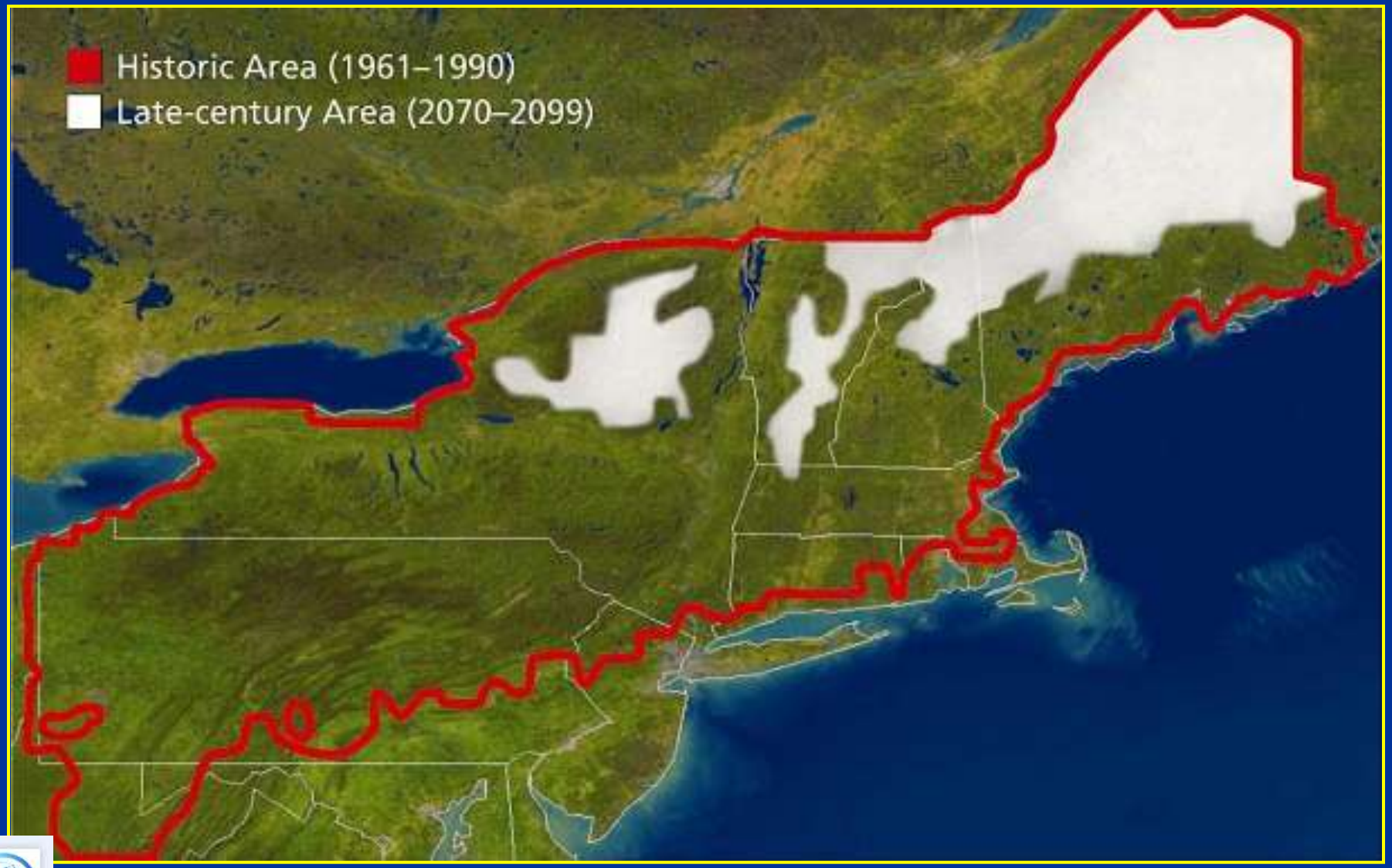
(NECIA, 2007)

Extreme Heat Days



(NECIA, 2007)

Projected changes in winter snow cover

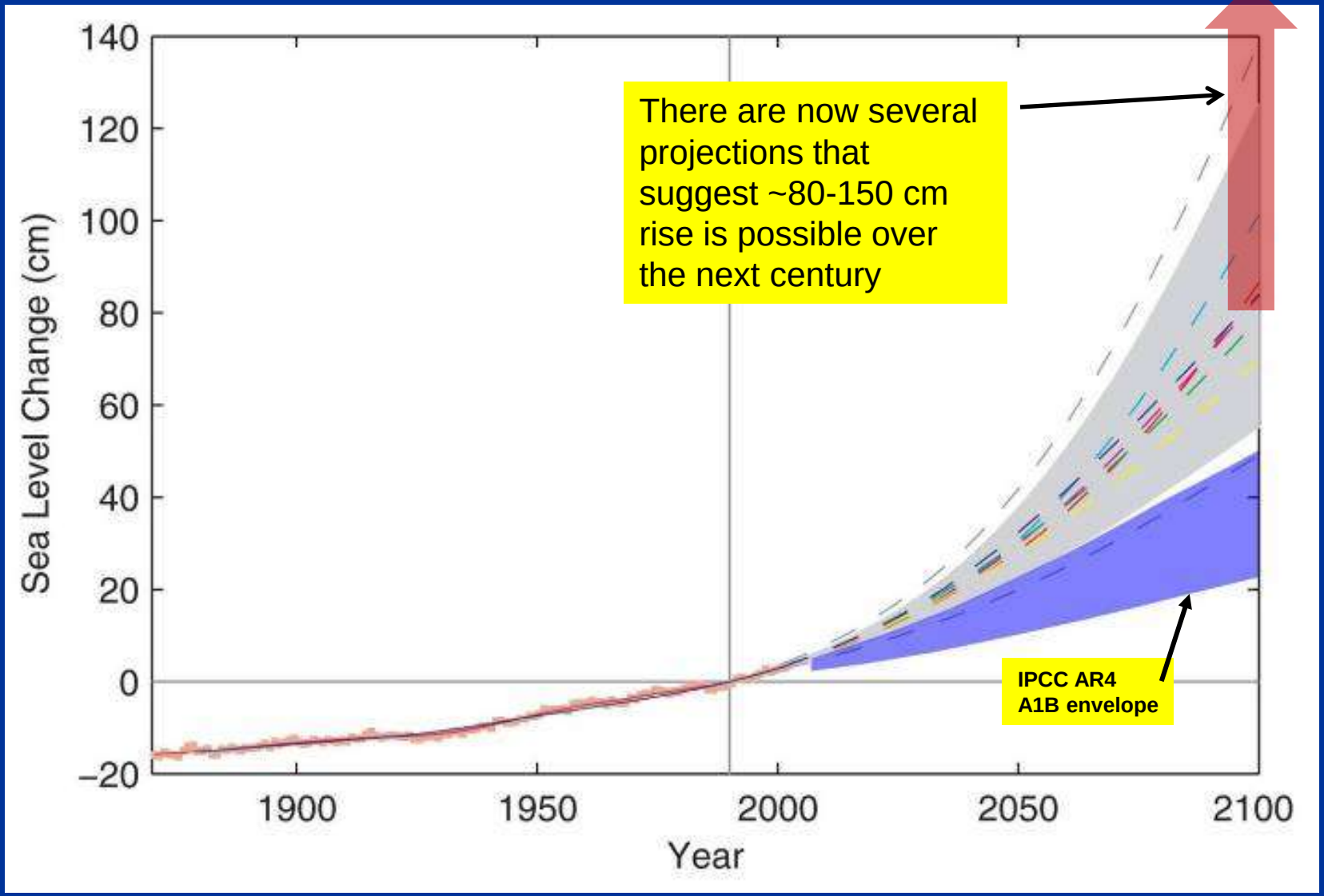


(NECIA, 2007)

Impacts on Forests, Fisheries, Agriculture, Health, Tourism

- Populations of maple, beech and birch shift 350-500 miles north
- Lobster and cod populations shift towards northern Gulf of Maine
- Insect and tree diseases flourish in warmer temperatures; more weeds and pests affect agriculture
- Greater infectious and vector-borne diseases, especially in vulnerable populations
- Increased impact on tourism, including coastal infrastructure and property, winter snow related activities

Historic and Projected Sea-level Rise



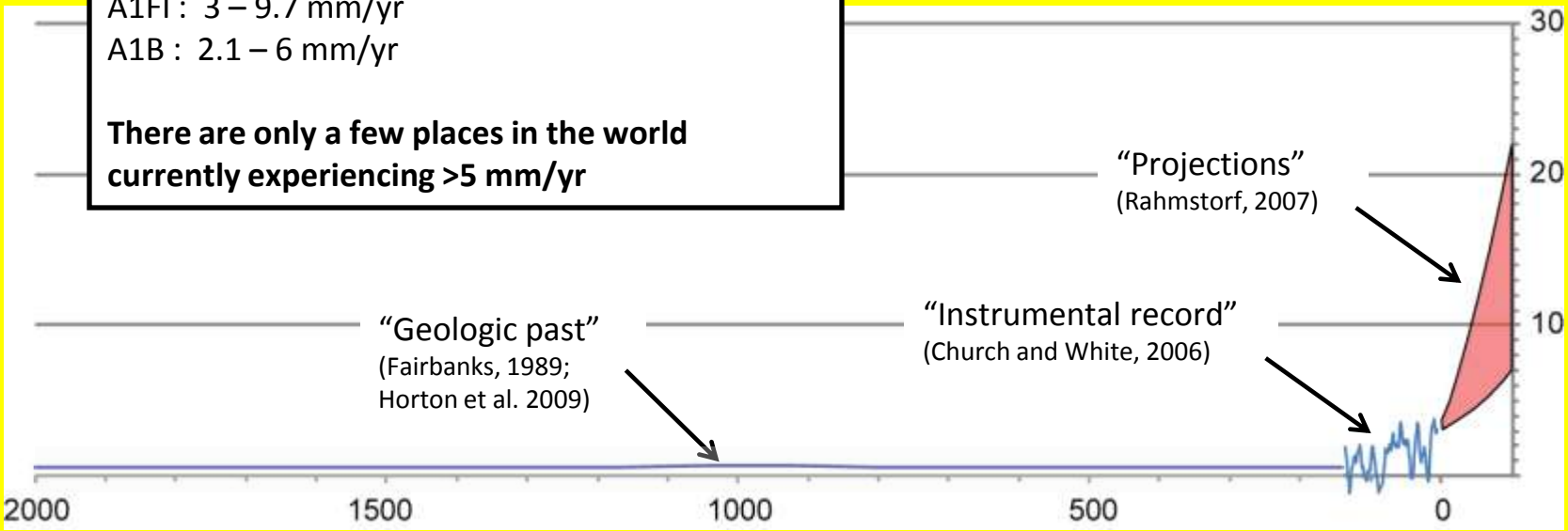
(modified after Rahmstorf, 2007; AR4 data from Bindoff, 2007)

Past and potential future rates of Sea-level Rise

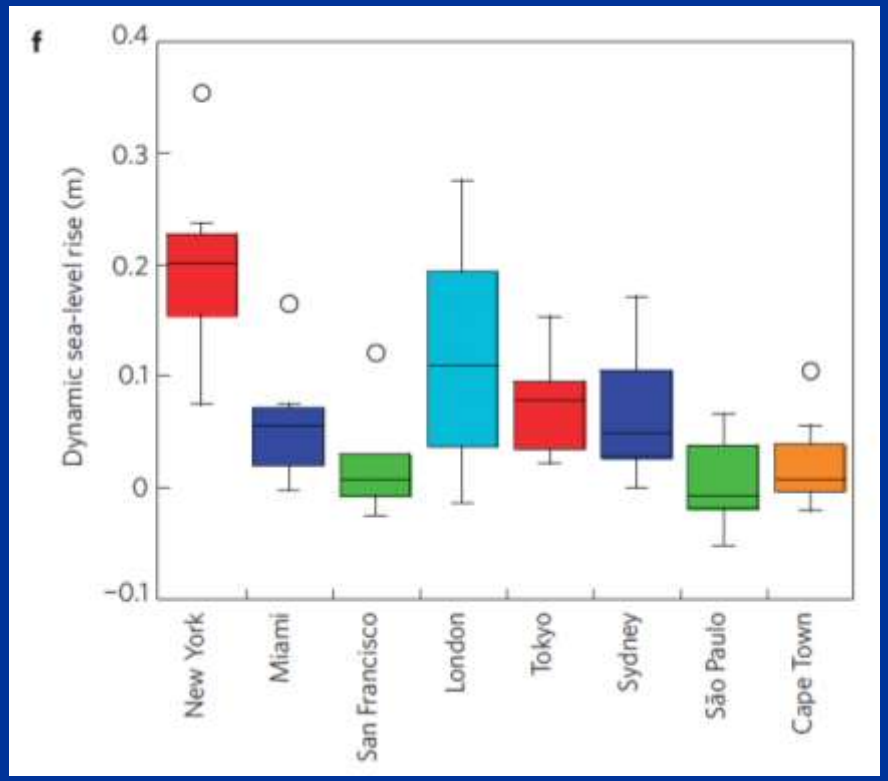
20th Century rate was 1.7 mm/yr

IPCC (2007) rates for the decade 2090-2099
A1FI : 3 – 9.7 mm/yr
A1B : 2.1 – 6 mm/yr

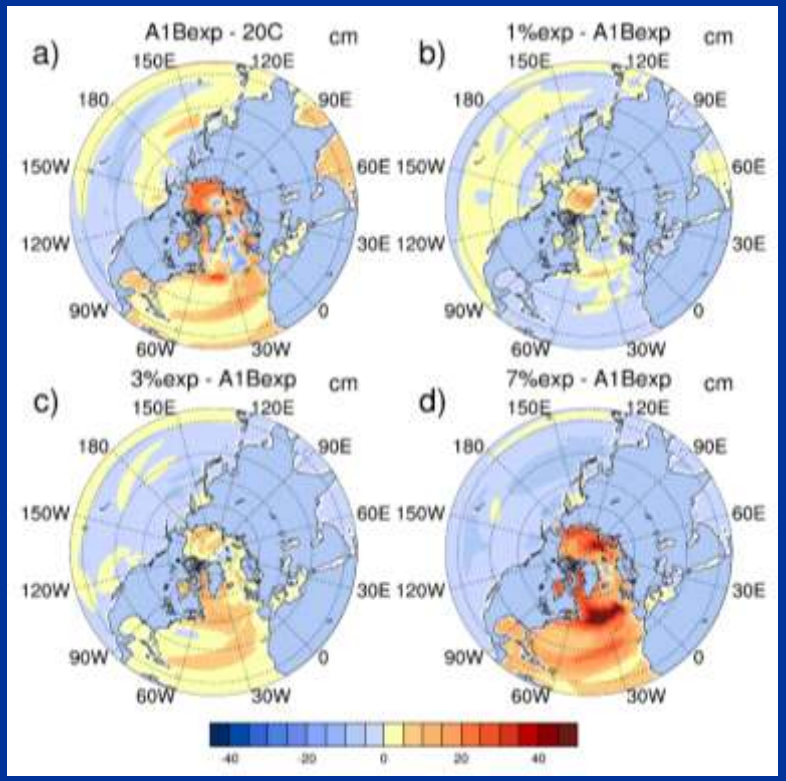
There are only a few places in the world currently experiencing >5 mm/yr



Another issue: regional variability in sea-level rise



(Yin et al., 2009)



(Hu et al., 2009)

Regional changes in circulation and ocean warming can increase sea-level by tens of centimeters, especially in the northeastern U.S.

Potential Coastal Flooding and Erosion

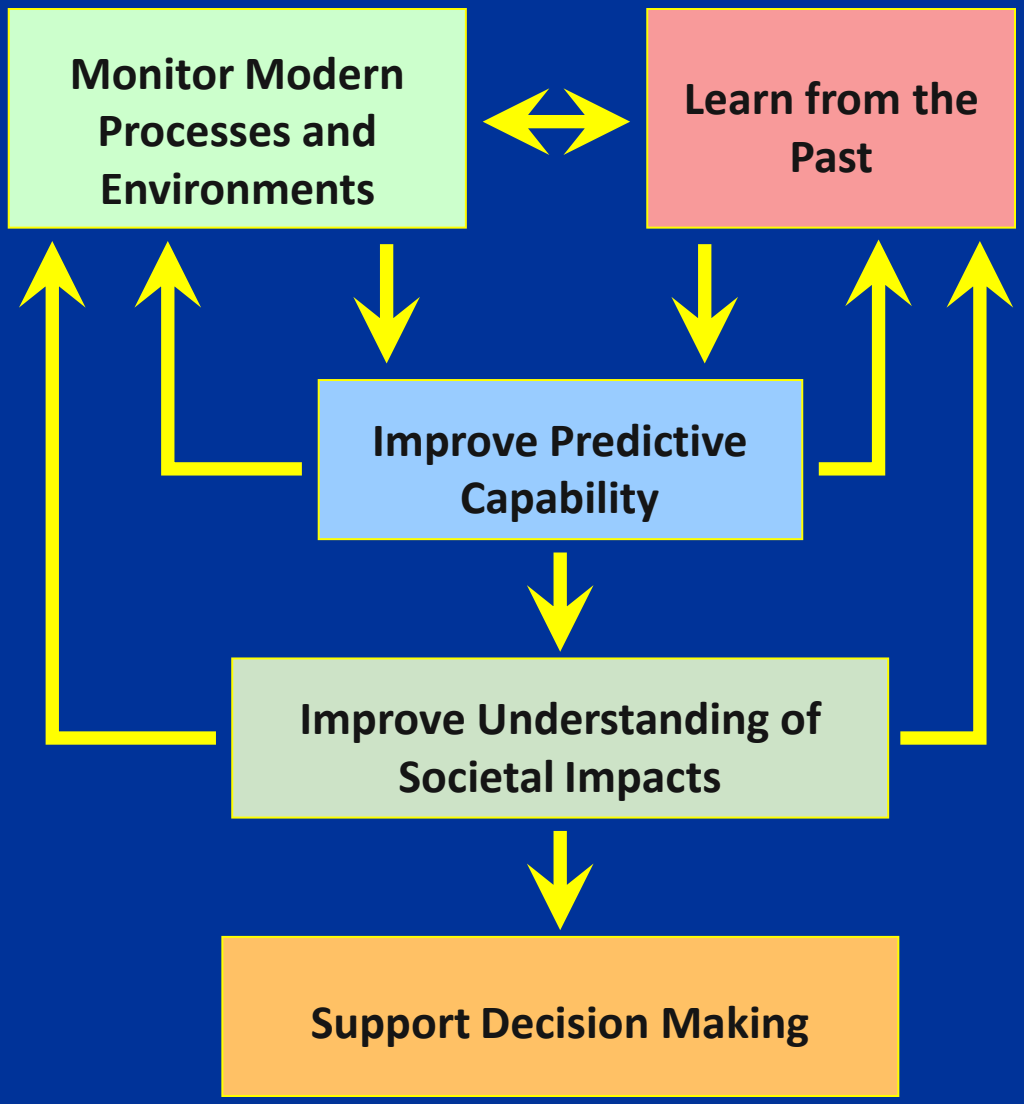
Under Present and Higher Emissions Sea Levels

(NECIA, 2007)

Common Themes Across CCAAC Subcommittees

- How do we quantify risks and evaluate adaptation, mitigation, and avoidance strategies?
- How do we coordinate data collection and dissemination of scientific knowledge?
- How do we translate science into policy and regulations?

Science strategy to address the challenge of climate change and sea-level rise

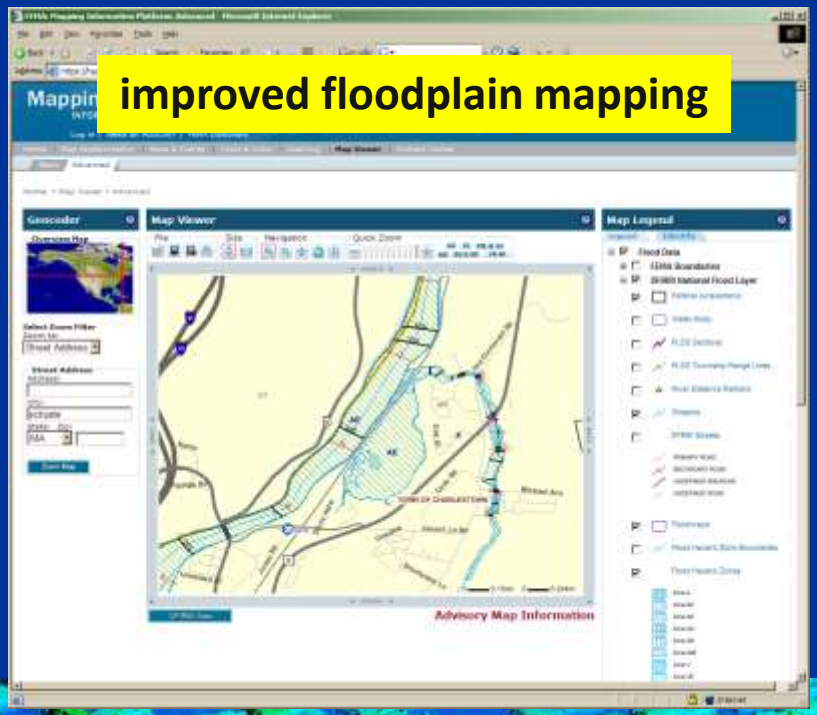


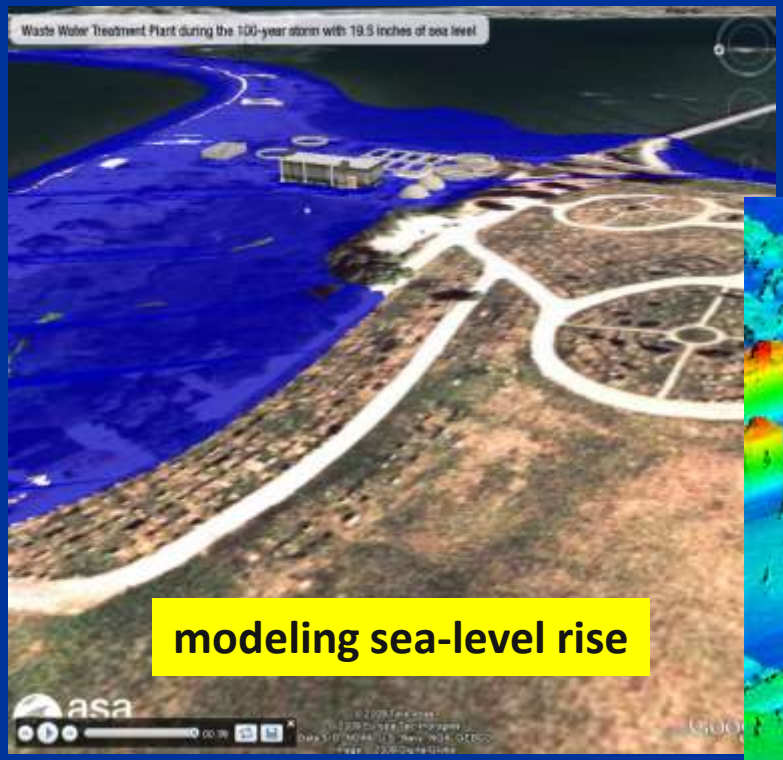
(Thieler et al., 2009)

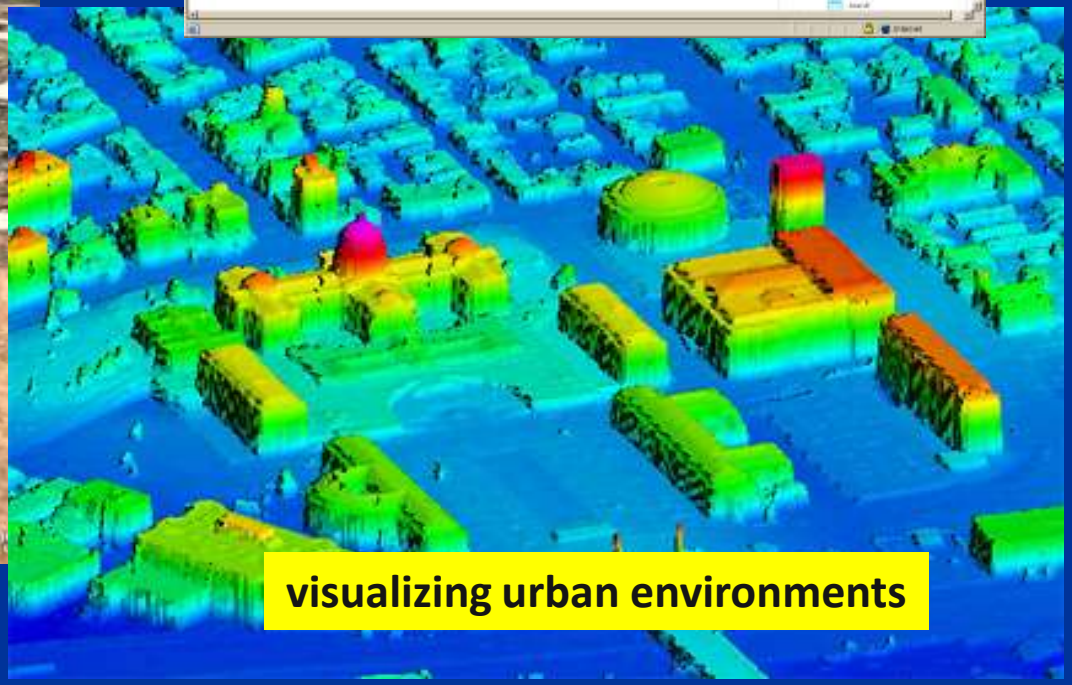
Science and Data Needs for the Future

- **Inventories, historic data, monitoring key strategic resources for climate change adaptation**
  - Describe how humans and resources are being affected
  - Inform adaptation decision making
- **Ongoing research and partnerships will be needed**
  - Provide answers to region- and sector-specific issues
  - Development and dissemination of knowledge across disciplines and scales
- **A good example is LiDAR elevation data**
  - Critical for evaluating floodplain risks
  - Broad application to other studies and planning statewide
  - Will need stable repository and periodic updates
  - Provides the basis for fundamental and applied research

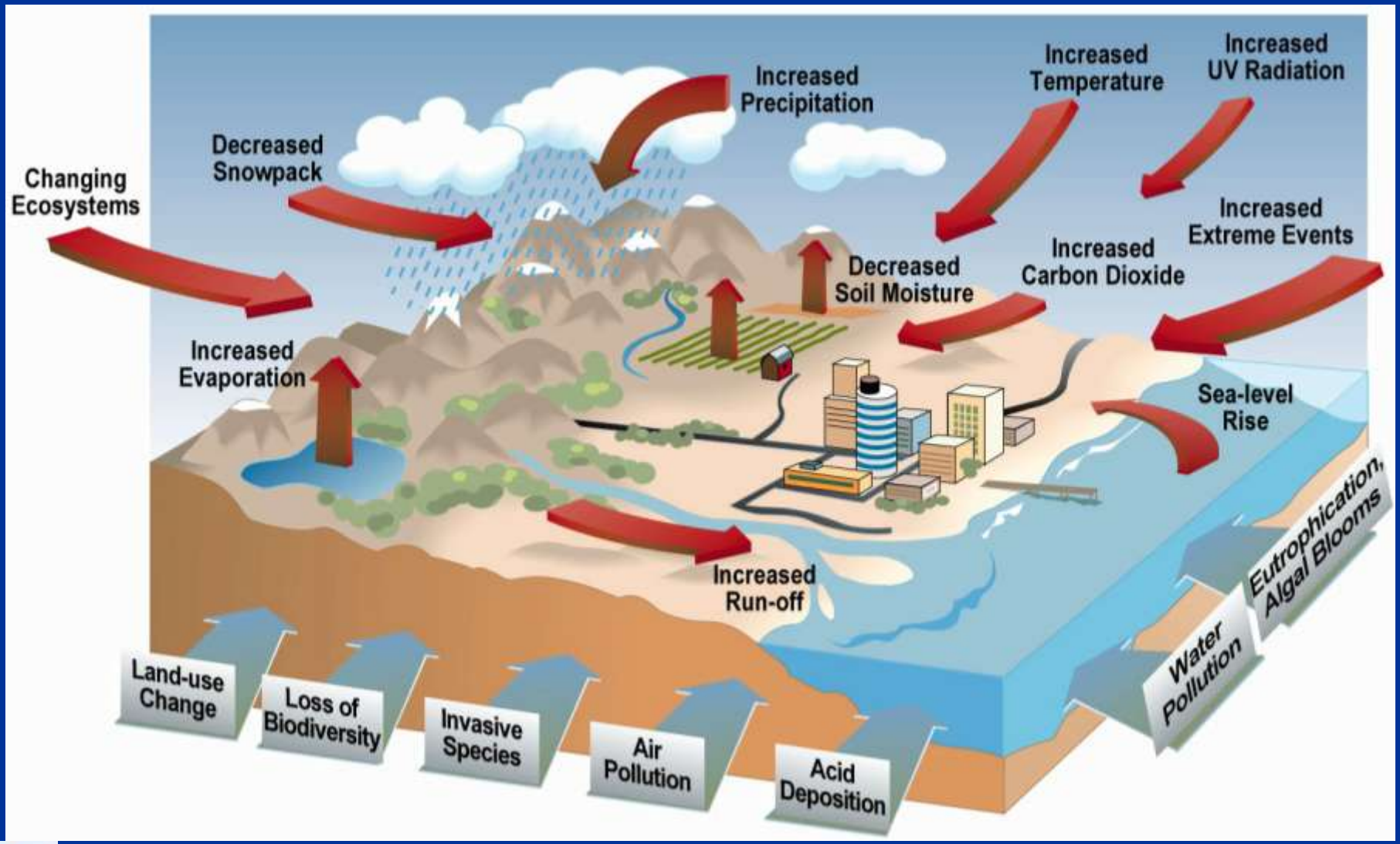
LiDAR is a technology for visualizing impacts of sea-level rise, mapping cities, estimating floodplains and anything else that needs to be mapped in 3D







Multiple Stresses of a Changing Climate



(CCSP, 2000)

Informing Decisions in a Changing Climate

Six Principles for Effective Decision Support

National Research Council (2009)

1. Begin with users' needs
2. Give priority to processes over products
3. Link information producers and users
4. Build connections across disciplines and organizations
5. Seek institutional stability
6. Design for learning

Thank you

Questions?